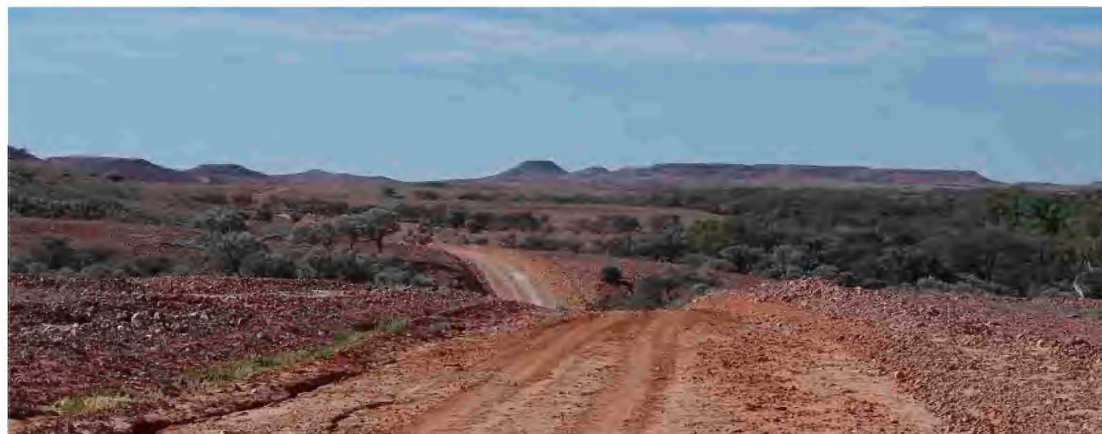


THE OLD STRZELECKI & LOOP TRACKS

BIRDS, MAMMALS, VEGETATION SURVEY 2015

A project undertaken by the Friends of the Innamincka Reserves



The Old Strzelecki Track (top) and Loop Track (lower), Innamincka Regional Reserve

REPORT ON THE OLD STRZELECKI & LOOP TRACKS

BIRDS, MAMMALS, VEGETATION SURVEY 2015

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REPORT ON THE OLD STRZELECKI/LOOP TRACKS BIRDS, MAMMALS, VEGETATION SURVEY 2015

INTRODUCTION

A. PROJECT COORDINATOR AND FIELD TEAM

Coordinator: Kate Buckley

Field Team: Mark Anderson, Euan Moore, Jenny Rolland, Rose Treilibs, Vern Treilibs

This project was carried out as a volunteer activity by members of the Friends of the Innamincka Reserves (FOIR). There was no external funding for the project.

B. BACKGROUND

In 2015, surveys were carried out at the beginning of August in two different locations, both within a 50 km radius of the town of Innamincka. The first was carried out in a south-westerly direction from Innamincka along the Old Strzelecki Track and the second, to the north-east, was carried out along the 'Loop Track'.

The Old Strzelecki Track extends from Innamincka south-west to Merty Merty, while the Loop Track extends from the Cordillo Downs Road 5 km north of Innamincka to join the Arrabury Road in Queensland. Together the two tracks encompass a range of habitat types from dry open woodlands and grasslands, dune systems and wetlands along the Old Strzelecki Track, to gibber plains and mesa country, known as the Merninie System, along the Loop Track. While average rainfall is low (177 mm per annum), the Innamincka area is in a region of maximum rainfall variability for Australia. In 2010 this area experienced extreme rainfall in terms of scale and intensity, resulting in closure of several roads during 2010-2011 (Appendix IV). The rainfall event came to an abrupt end and has been closer to average or low since then. More recently there has been a period with generally below average rainfall. During the 12 months leading up to this survey there was just over 200 mm of rain of which 130 mm fell in January 2015¹.

The FOIR survey provides data for monitoring changes to populations of terrestrial birds, mammals and vegetation as the weather conditions change between 'normal', dry and ecological boom. It also enables assessment of the impacts of other environmental changes such as mining and road-making.

This survey is the third in a series of surveys conducted by FOIR. The previous surveys were conducted in 2013 along the Bore Track North² and in 2014 along the Coongie Road³.

¹ Bureau of Meteorology

http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=136&p_display_type=dailyDataFile&p_startYear=2015&p_c=-58181678&p_stn_num=017028

² FOIR Bore Track North Survey Project Report 2013

³ FOIR Coongie Road Survey Project Report 2014

C. APPROACH

A series of surveys were set up along the Old Strzelecki and Loop Tracks to establish a repeatable technique to monitor the distribution and abundance of bird species, mammals and vegetation with changes in climate and other impacts on the habitat. Transects covering differing vegetation types were sampled, providing invaluable baseline data for assessing future changes. Surveys were undertaken from five census stops, each 10 km apart, along the Old Strzelecki Track, with the most south-westerly census stop just south of the Dillon Highway but still within the Innamincka Regional Reserve. A further series of surveys were undertaken at five census stops along the Loop Track, each 10 km apart except for the middle one which was 5 km from adjacent census stops in order to sample the mesa country. This also ensured that all surveys along the Loop Track were completed within the Reserve.

Landscape conditions did not require modification of census stop locations or routes during this survey except for the census stop selected to sample the mesa country, however this may become necessary if the survey is repeated at a time when some of the flood channels are holding water.

D. OBJECTIVES

- 1) To collect data systematically for bird, mammal and plant species, at a series of surveys spanning ~80 km in total along the Old Strzelecki and Loop Tracks.
- 2) To relate species occurrence to climatic and environmental variables.
- 3) To put in place a census strategy that can be repeated and potentially expanded in the future to detect the impacts of short- and long-term changes in climate and environment on populations and species.
- 4) To use a bird survey technique equivalent to a 'fixed-route' survey as specified for the Birdlife Australia Atlas project.
- 5) To present results quickly to provide the baseline data for ongoing research.
- 6) To use these data to facilitate further monitoring of the change in population diversity and abundance as the conditions change to drier or wetter or due to other environmental impacts such as mining, road-making.

E. PROGRAMME OF RESEARCH

Surveys were conducted from 1st to 3rd August, 2015.

METHODS

1. Survey overview and terminology

The tracks were surveyed using the method described below, travelling an average of 30-50 km per day along the road, with census stops every 10 km (except for one stop which was 5 km from adjacent stops). The survey method is adapted from methodology used by Rob Clemens and Richard Fuller (School of Biological Sciences, University of Queensland) for similar surveys in outback S.A. The bird survey technique is equivalent to a 'fixed-route' survey as specified for the Birdlife Australia Atlas database (Birdata).

Key terminology (see also diagram in Figure 1 below):

A **census stop** is one of the points placed at intervals along the road. The census stop forms a central point for conducting surveys in the surrounding habitat. The locations of all census stops are provided as GPS waypoints. If the exact location of the waypoint proves to be inaccessible, then the point is established along the road closest to the waypoint location.

A **corner point** is one of the corner points of a survey square.

A **transect** is one of the sides of a survey square.

2. A typical day

A typical day commences at first light, travelling to the first census stop, surveying for 1.5-2 hours, and then moving to the next census stop for a further survey. Surveying finishes at around 11am-noon, when bird activity begins to decline noticeably. After a break during the heat of the day, surveys continue late in the afternoon when bird activity has increased again. Key equipment items for the surveys are listed in Appendix VI.

3. Communication

The team maintains contact using vehicle and hand-held UHF radios.

4. Briefing session

Before commencing surveys, leaders should brief the group on GPS technique for the survey and how to complete the survey sheets to ensure consistent data collection. The GPS co-ordinate system used is UTM and members should be familiar with how to select this on their GPS. A practice field session on using the GPS to complete a square is recommended. Two alternative methods for using the GPS to navigate a survey square are given in Appendix V.

5. Survey work at each census stop

The following protocol is adopted for the baseline survey and should be followed as closely as possible in future repeat surveys. If there are sufficient members in the group, half the group will take the east survey and the other half the west survey at each census stop.

(i) Upon arriving at a census stop, park the vehicle safely and place a hazard indicator (e.g. witch's hat) behind the cars if deemed necessary. Walk off the road 20 m from the census stop, left of the road when travelling south. Mark this starting location in the GPS (see diagram below). Erect star dropper and attach metal tag with identifying detail e.g. 2015 FOIR 1 (see photo below). This is corner point 1 in Figure 1.

(ii) Write the co-ordinates onto the survey sheet to ensure they are not lost and note the weather details. Note down the dominant habitat type in the area surrounding the starting point (corner point 1). Choose from gibber, grassland, dunes, shrubland, lignum, woodland, wetland. Record dominant species in the vegetation if known. Take a photo of the survey sheet and then take representative photographs of the habitat at the starting point, one towards the centre of the transect square and, turning 180°, one towards the outside. If walking around the transect square in a clockwise direction (as was done for this survey), the photos would be taken towards the right and then the left (see photo labels in Appendix III).



(iii) Using a GPS to guide you, walk east for 500 m, conducting a line transect survey as you go (see methods below under 6. *Line Transect method* and *Appendix V. Using a GPS to navigate a transect square*). As each transect line follows grid north/south or east/west, maintaining a constant grid northing or easting as appropriate allows the navigator to stay on the transect line. If your route has to deviate around obstacles etc., return to the transect once the obstacle has been passed.

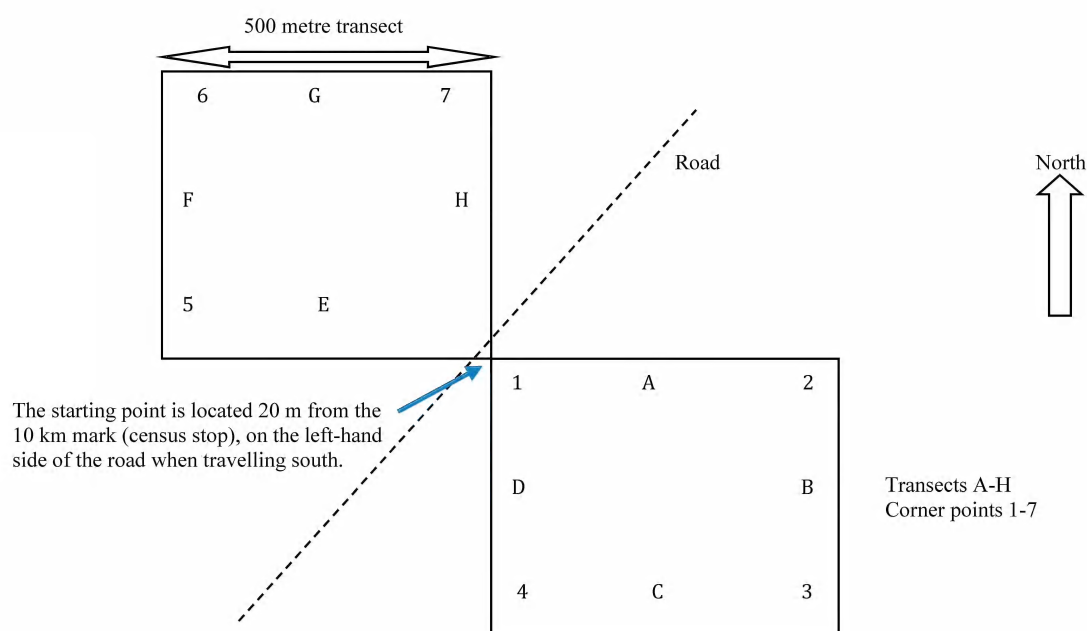


Fig. 1. Diagram of survey transect squares for each census stop

(iv) At 500 m from the starting point, i.e. at corner point 2, write the co-ordinates onto the survey sheet, note the time, and take a photo of the survey sheet and then of the habitat towards the centre and outside of the transect square as before. Continue in this fashion following the scheme in the diagram until 8 line transects have been completed.

(v) Aim to complete all the survey work for each census stop within 1.5-2 hours.

6. Line Transect method

(i) Walk slowly along the transect line, looking and listening for birds. Pay careful attention for birds that are flushed from ground cover as you approach. For each individual or group of

birds seen, note down (a) the species including age & sex if determined, (b) the number of birds in the group, (c) whether you heard and/or saw the birds, and (d) any evidence of breeding or feeding activity. Use a separate survey sheet for each 500 m transect. Avoid double counting on adjacent transects.

(ii) If you need to stop to check birds do so, but try to keep a roughly even averaged slow walking pace throughout the transect.

(iii) There is no maximum distance for recording birds – every bird you detect should be noted.

(iv) Note down any change in the dominant habitat type through which the transect passes (write across the line in the data collection columns). Choose from gibber, grassland, dunes, shrubland, lignum, woodland, wetland. Record dominant species in the vegetation if known. Take representative photographs of the habitat. Ensure there is a photo of the survey sheet prior to the habitat photo so it is always clear which transect the photo belongs to.



Checking plants at start of survey

(v) Note (write across the line in the data collection columns) and photograph any mammal tracks or other traces and sightings of mammals. A GPS reading for any significant sightings should be recorded.

(vi) Record any threats or impacting factors noted e.g. soil erosion, weeds (e.g. Buffel Grass, *Acacia farnesiana*), feral animals, mining, road-making, grazing, fire, water/drainage disturbance, strong wind.

7. Incidental surveys while driving between census stops

(i) While driving between census stops, if you come across a particularly large group of birds, something very rare, or anything in the environment that seems relevant to the aims of the study, stop and do a 5 minute point count, after taking a GPS waypoint. Ensure that you note down why the extra survey has been conducted e.g. “Cinnamon Quailthrush crossed the road”. These qualify as an incidental survey in the Birdlife Australia Atlas database (Birdata).

(ii) Stop at any wetlands that are visible from the road, and do a count of any water-birds visible (2 ha/20 min, 500 m radius or 5 min incidental survey as appropriate). Be sure to GPS the location from which you do the survey, and take a photo of the wetland.

(iii) A count of all mammals (feral and domestic) that are seen should be recorded.

(iv) Make a note of any items left on or near the road such as tyres, garbage or equipment and record any threats (as described above, 6(vi)).

RESULTS AND DISCUSSION

A total of ten census stops were established along the lengths of the Old Strzelecki and Loop Tracks within the Innamincka Regional Reserve. For this survey, the census stops were labelled SL1-10. The exact location of the census stops and the co-ordinates for the survey points are given in Appendix I.

A. BIRD SURVEY DATA

Bird surveys were conducted over three days, 1-3 August, 2015. Most surveying was carried out before 12:00 or after 15:00 when conditions were cooler and winds generally not so strong. Census stop SL7 was surveyed during the early afternoon so as to complete all surveys within the three day period. Full details of the bird survey data are given in Appendix II and summaries of the data are presented in the tables below.

Table 1: Summary of numbers of birds observed for each census stop					
Date and start time	Census Stop	Number of species	Number of individuals	Number of waterbird species	Number of waterbirds
01/08/2015 08:10	SL1	13	177	0	0
01/08/2015 09:35	SL2	12	73	0	0
01/08/2015 15:50	SL3	14	251	0	0
02/08/2015 07:53	SL4	20	141	0	0
02/08/2015 09:50	SL5	34	351	4	19
03/08/2015 15:23	SL6	20	457	0	0
03/08/2015 13:04	SL7	14	86	0	0
03/08/2015 09:45	SL8	7	119	0	0
03/08/2015 07:45	SL9	12	50	0	0
02/08/2015 15:45	SL10	4	4	0	0
Average		15	171		

Table 2: Summary of counts by census stop for each bird species (all sites)						
Species	No. of census stops where present	Total count	Min. count /stop when present	Max. count /stop	Average /stop when present	Average for all 10 stops
Emu	1	2	2	2	2.0	0.2
Pacific Black Duck	1	15	15	15	15.0	1.5
Whistling Kite	1	2	2	2	2.0	0.2
Black Kite	1	5	5	5	5.0	0.5
Wedge-tailed Eagle	1	4	4	4	4.0	0.4
Brown Falcon	3	3	1	1	1.0	0.3
Black Falcon	1	1	1	1	1.0	0.1
Australian Hobby	1	1	1	1	1.0	0.1
Nankeen Kestrel	6	9	1	2	1.5	0.9
Glossy Ibis	1	1	1	1	1.0	0.1

White-faced Heron	1	1	1	1	1.0	0.1
Brolga	1	2	2	2	2.0	0.2
Crested Pigeon	7	30	1	14	4.3	3
Diamond Dove	1	1	1	1	1.0	0.1
Peaceful Dove	1	2	2	2	2.0	0.2
Little Corella	4	587	2	355	146.7	58.7
Galah	7	31	1	6	4.4	3.1
Cockatiel	3	10	1	7	3.3	1
Bourke's Parrot	3	11	2	7	3.7	1.1
Budgerigar	6	325	9	137	5.4	32.5
Red-backed Kingfisher	1	1	1	1	1.0	0.1
Horsfield's Bronze-cuckoo	2	4	1	3	2.0	0.2
Black-eared Cuckoo	1	1	1	1	1.0	0.1
Striated Pardalote	1	2	2	2	2.0	0.2
Red-browed Pardalote	3	5	1	3	1.7	0.5
Variegated Fairywren	1	3	3	3	3.0	0.3
White-winged Fairywren	4	15	1	9	3.7	1.5
Spiny-cheeked Honeyeater	3	10	2	6	3.3	1.0
White-plumed Honeyeater	5	50	1	21	10.0	5.0
Singing Honeyeater	7	38	1	10	5.4	3.8
Yellow-throated Miner	2	9	3	6	4.5	0.9
Pied Honeyeater	1	1	1	1	1.0	0.1
Crimson Chat	7	74	2	32	10.6	7.4
Cinnamon Quail-thrush	2	2	1	1	1.0	0.2
Chirruping Wedgebill	2	3	1	2	1.5	0.3
Willie Wagtail	5	16	2	6	3.2	1.6
Magpie-lark	1	1	1	1	1.0	0.1
Rufous Whistler	2	2	1	1	1.0	0.2
Grey Shrikethrush	1	1	1	1	1.0	0.1
Black-faced Cuckooshrike	3	7	1	5	2.3	0.7
Black-faced Woodswallow	9	113	1	25	12.6	11.3
Grey Butcherbird	1	1	1	1	1.0	0.1
Australian Magpie	5	11	1	3	2.2	1.1
Australian Raven	6	13	1	4	2.2	1.3
Little Crow	4	28	1	20	7.0	2.8
Australian Pipit	1	1	1	1	1.0	0.1
Tree Martin	3	7	1	5	2.3	0.7
Rufous Songlark	1	6	6	6	6.0	0.6
Zebra Finch	8	210	6	77	26.2	21.0
Falcon sp.	1	1	1	1	1.0	0.1
Fairywren sp.	3	5	1	2	2.7	0.2
Thornbill sp.	1	1	1	1	1.0	0.1
Babbler sp.	4	15	1	8	3.7	1.5
Crow/raven sp.	2	16	5	11	8.0	1.6
Total Species		47⁴				
Total Individuals		1661				

⁴ Excludes species where full identification was not possible

There were 47 species of bird (1661 individuals) recorded across all surveys with an average of 15 species per census stop (min. 4, max. 34). No species was found at all census stops although Black-faced Woodswallows and Zebra Finches were found at 9 and 8 census stops, respectively. Twenty-four species were found only at a single site.

The most numerous species were Little Corella (587), Budgerigar (325) and Zebra Finch (210). All these species form flocks. Large flocks of Little Corella occur in the area with the largest flock recorded at a census stop being 355 individuals. Little Corella were present at four census stops. Budgerigars are renowned for forming enormous flocks when conditions are favorable. While not in the numbers seen during boom times, two sites recorded more than 100 Budgerigars on each site. Most flocks of Budgerigars were between 10 and 30. Zebra Finches were seen at most sites, mainly in small flocks of less than 20 individuals.

There were a number of sightings that were not identified to species level. There were 38 individual birds from 5 families in this category. The majority of these were corvids or babblers.

There are potentially three corvids in this area - Australian Raven, Little Crow and Torresian Crow. The latter is a rare vagrant in this area and has not been recorded on any of our surveys over the past five years. For the purposes of the analysis in Table 3 below, unidentified corvids have been allocated proportionately to either Little Crow or Australian Raven based on the numbers of each species that were positively identified during this part of the survey. All unidentified corvids were recorded along the old Strzelecki Track with twice as many Little Crows as Australian Ravens.

Babblers were seen or heard at four census stops but were not identified to species level. Two species of babbler are known from this area - Chestnut-crowned and White-browed. Chestnut-crowned Babbler are most frequently reported from this area.

Unidentified fairywrens were found at three sites along the old Strzelecki Track. A total of five individuals were seen. These were most likely White-winged Fairywrens which are the common species across the survey area.

A thornbill was recorded on one site where it was inhabiting Red Mulga woodland along a creek-line. There are low numbers of Chestnut-rumped Thornbill in this area. The survey area is between the two major population areas for the Slaty-backed Thornbill, but it was suggested that the thornbill observed may have been this species. Unfortunately photographs were not obtained.

A single unidentified medium sized falcon was seen at census stop SL10 but was unable to be identified. It was most likely a Brown Falcon but may have been a Black Falcon.

The surveys crossed two distinct landforms which are treated separately in the following two tables.

The five southern surveys along the Old Strzelecki Track were all on the floodplain of the Strzelecki Creek. The surveys covered floodplain, low sand dunes and in some cases water channels. There were eleven species that were only encountered in these habitats.

Most surveys in this area were fairly uniform in their results. The exception was census stop SL5 where the survey transects crossed Strzelecki Creek and included Burlieburly Waterhole which still contained water. A total of 35 species was found at this census stop compared to others in this section where the number of species ranged from 12 to 21. Four of the extra

Table 3: Birds recorded at census stops along the Old Strzelecki Track (5 sites)						
Species	No. of census stops where present	Total	Min. count when present	Max. count	Average when present	Average for all 5 stops
Emu	1	2	2	2	2.0	0.4
Pacific Black Duck	1	15	15	15	15.0	3.0
Whistling Kite	1	2	2	2	2.0	0.4
Black Kite	1	5	5	5	5.0	1.0
Brown Falcon	3	3	1	1	1.0	0.6
Black Falcon	1	1	1	1	1.0	0.2
Nankeen Kestrel	3	5	1	2	1.7	1.0
White-faced Heron	1	1	1	1	1.0	0.2
Glossy Ibis	1	1	1	1	1.0	0.2
Brolga	1	2	2	2	2.0	0.4
Crested Pigeon	4	21	1	14	5.3	4.2
Peaceful Dove	1	2	2	2	2.0	0.4
Diamond Dove	1	1	1	1	1.0	0.2
Little Corella	2	170	2	168	85.0	34.0
Galah	5	25	3	6	5.0	5.0
Cockatiel	2	9	2	7	4.5	1.4
Budgerigar	5	311	9	137	62.2	62.2
Bourke's Parrot	1	2	2	2	2.0	0.4
Horsfield's Bronze-cuckoo	2	4	1	3	2.0	0.8
Red-backed Kingfisher	1	2	2	2	2.0	0.4
White-winged Fairywren	4	11	1	9	2.8	2.2
Red-browed Pardalote	3	5	0	3	1.7	1.0
Yellow-throated Miner	2	9	0	6	4.5	1.8
White-plumed Honeyeater	3	40	0	21	13.3	8.0
Singing Honeyeater	3	8	0	4	2.7	1.6
Spiny-cheeked Honeyeater	1	2	0	2	2.0	0.4
Crimson Chat	4	48	0	32	12.0	9.6
Rufous Whistler	1	1	0	1	1.0	0.2
Cinnamon Quail thrush	2	2	0	1	2.0	0.4
Chirruping Wedgebill	2	3	0	2	1.5	0.6
Willie Wagtail	3	12	0	6	4.0	2.4
Magpie-lark	1	1	0	1	1.0	0.2
Australian Magpie	2	5	0	3	2.5	1.0
Australian Raven	4	15	0	6	3.8	3.0
Little Crow	3	30	0	20	10.0	6.0
Black-faced Cuckooshrike	1	1	0	1	1.0	0.2
Black-faced Woodswallow	5	87	13	25	17.4	17.4
Australasian Pipit	1	1	0	1	1.0	0.2
Rufous Songlark	1	6	0	6	6.0	1.2

Tree Martin	2	6	0	5	3.0	1.2
Zebra Finch	5	103	6	35	20.6	20.6
Fairywren sp	3	5	0	2	1.7	1.0
Babbler sp.	3	13	0	8	4.3	2.6
Total Species		41⁵				
Total Individuals		980				

species were water or wetland birds (Grey Teal, Brolga, White-faced Heron and Glossy Ibis) while others (Diamond and Peaceful Doves) require ready access to water for drinking. The presence of both Black and Whistling Kites at this site could be related more to the proximity of the Innamincka township and rubbish tip, 5 km to the north than to the nearby water although the water will attract potential prey.

Away from the water, dominant species included Galahs and Budgerigars, both wide ranging species which occurred at all five census stops. The only passerines to occur at all five sites were Zebra Finches and Black-faced Woodswallows.



Glossy Ibis at Burlieburly Waterhole

Zebra Finches along with Crested Pigeons were notable in being the only granivores that were found away from water. In contrast, most other birds found at these census stops were insectivores or, in the case of the honeyeaters, omnivores eating both nectar and insects.

Five species of raptor were recorded on this part of the survey - Whistling Kite and Black Kite, mentioned above, and three species of falcon. Nankeen Kestrel were widespread in low numbers across the survey area and recorded at three census stops. This species feeds on insects and small vertebrates such as lizards. Brown Falcons were also widespread but in lower numbers and there was a single sighting of Black Falcon.

Bird numbers were generally low across all census stop surveys with most species recorded at a rate of less than 2 birds per kilometer of transect. It was only Crimson Chats, Zebra Finches, Black-Faced Woodswallows amongst the passerines that exceeded this threshold. Galahs and Budgerigars also had a high a reporting rate which is largely a result of their flocking behaviour. The high numbers of these later species brought the average density of birds up to 48 per kilometer of transect.

The five northern surveys along the Loop Track were all on hilly and stony country. While these surveys did include creek-lines, only about 10% of the area covered was on floodplain and somewhat comparable to the southern surveys.

⁵ Excludes species where full identification was not possible except in the case of corvid species

Table 4: Birds recorded at census stops along the Loop Track (5 sites)						
Species	No. of stops	Total	Min. where present	Max. count	Average when present	Average for all 5 stops
Wedge-tailed Eagle	1	4	4	4	4	0.8
Australian Hobby	1	1	1	1	1	0.2
Nankeen Kestrel	3	4	1	2	1.3	0.8
Crested Pigeon	3	9	1	5	3	1.8
Little Corella	2	417	62	355	208.5	83.4
Galah	2	6	1	5	3	1.2
Cockatiel	1	1	1	1	1	0.2
Budgerigar	1	14	14	14	14	2.8
Bourke's Parrot	2	9	2	7	4.5	1.8
Black-eared Cuckoo	1	1	1	1	1	0.2
White-winged Fairywren	1	4	4	4	4	0.8
Variegated Fairywren	1	3	3	3	3	0.6
Striated Pardalote	1	2	2	2	2	0.4
White-plumed Honeyeater	2	10	2	8	5	2
Singing Honeyeater	4	30	4	10	7.5	6
Spiny-cheeked Honeyeater	2	8	2	6	4	1.6
Pied Honeyeater	1	1	1	1	1	0.2
Crimson Chat	3	26	4	12	8.7	5.2
Rufous Whistler	1	1	1	1	1	0.2
Grey Shrikethrush	1	1	1	1	1	0.2
Willie Wagtail	2	4	2	2	2	0.8
Grey butcherbird	1	1	1	1	1	0.2
Australian Magpie	3	6	1	3	2	1.2
Australian Raven	2	4	1	3	2	0.8
Little Crow	3	8	1	4	2.7	1.6
Black-faced Cuckooshrike	2	6	1	5	3	1.2
Black-faced Woodswallow	4	26	1	18	6.5	5.2
Tree Martin	1	1	1	1	1	0.2
Zebra Finch	3	107	7	77	35.7	21.4
Falcon	1	1	1	1	1	0.2
Thornbill sp.	1	1	1	1	1	0.2
Total Species		29⁶				
Total Individuals		717				

⁶ Excludes species where full identification was not possible

On this section of the survey, no species was found at all five census stops. The number of individuals was generally low for all species that were found. This can be attributed to the harsher habitat at all census stops where the dominant ground cover was rock with scattered herbs and forbs. Trees and shrubs only occurred along creek-lines.

Little Corella occurred at two census stops, in both cases as large flocks which distorted the aggregated counts. Zebra Finch was the other species that was present in reasonable numbers at three of the five sites.

A total of 717 birds were recorded over 29 species. This is a reporting rate of 35.9 birds per kilometer of transect. Excluding Little Corella and Zebra Finch from this total, only 194 individuals were recorded for the remaining 30 species which represents a reporting rate of 9.7 birds per kilometer.

Black-faced Woodswallows and Singing Honeyeaters occurred at four of the five sites. They were found close to creek-lines where low trees provided suitable habitat and lookout points for the woodswallows.

Most birds were found in woodlands along the creek-lines and watercourses. Very few birds were found away from creek-lines except when flying overhead. The exception was a pair of Gibberbirds that were encountered between census stops SL8 and SL9.



Gibberbird

B. HABITATS

The landforms along the Old Strzelecki Track are part of the Strzelecki Land Systems. Here they are predominantly Coolibah floodplain which generally has gentle gradients and low relief. The floodplain consists of friable silts and 'gilgai' or cracking muds and clays which are dissected intermittently by ephemeral lakes, channels and waterholes, largely associated with Strzelecki Creek. Interspersed in the floodplain is the occasional undulating sand plain and low rising sand ridge. Soil varied from fine silt to sand to sandy or clay loam to clay.

Watercourses, waterholes and their associated flood-out areas mainly support an open Coolibah woodland. A particular waterhole, Burlieburle on the Strzelecki Creek contained some remnant water from the recent rains which attracted several different species of water birds. A denser Coolibah canopy and more complex woodland including *Eremophila longifolia* and Whitewood (*Atalaya hemiglauca*) were also associated with this waterhole. The occasional pink sand ridge was partially bare, with some dense stands of hop bush (*Dodonea viscosa*) and scattered Desert Rattlepod (*Croatalaria eremea*), while the lower slopes were scattered with *Senna* sp. and wattles such as *Acacia tetragonophylla*. The swales with less runoff tended to support a low sparse understory of chenopods such as *Sclerolaena* sp. and grasses such as *Eragrostis* sp. The gentle rising sand plains contained a sparse stand of Silver Needlewood (*Hakea leucoptera*) or scattered Whitewood. The dune tops and swales in particular were resplendent with patches of freshly emergent herbs such as *Senecio gregorii* and poached egg daisy (*Polycalymma stuartii*) after the recent rains. The gilgai floodplain supported a sparse covering of low Coolibah with a scattered understory of Golden Goosefoot (*Chenopodium auricomum*), occasional saltbush, lignum and *Sclerolaena* sp., most of which were in a semi-desiccated state. Scattered amongst these were dried grasses and herbs. Small clay pans devoid of vegetation were occasionally encountered.

Dramatically different terrain was encountered in the Merninie System on the second stage of the survey. Five surveys were carried out along a 30 km section of the Loop Track which wended its way upwards across vast treeless gibber rises and stony plains, through the ranges of mesas and hills. The road crossed several major and minor dry creek beds. These were evident by their dark green tree-lined vegetation dominated by Gidgee (*Acacia cambagei*) and lower down accompanied by some Red Mulga (*Acacia cyperophylla*) and occasionally Coolibah (*Euc. coolabah*) in the largest creek-beds. A persistent cool, drying wind from the south-west, which fluctuated in intensity, kept the temperature down while contributing to the constant erosion of the exposed landscape.

The recent rains had been fairly patchy in this area, resulting in occasional carpets of bright green colour from the freshly emergent forbs such as Burr Daisy (*Calotis* sp.), *Sclerolaena* sp. and *Ptilotus* sp. Other areas, usually further from Innamincka, contained desiccated tussocks and forbs. The steeper slopes leading to mesas and rocky ridges had a sparse low covering of chenopods such as saltbush and *Sclerolaena* interspersed with isolated *Eremophila* and *Senna* shrubs. Some of the lower flatter slopes which were less densely covered by gibber had a sparse layer of Mitchell Grass tussocks, typically *Astrelba pectinata* and *Sclerolaena* sp. The majority of the woodland birds were seen in and around the tree-lined creeks. The occasional raptor, corvid or magpie was seen on the gibber slopes and White-winged Fairywren in the Dead Finish (*Acacia tetragonophylla*) on a rocky ridge.

Table 5: Bird species by vegetation type at census stops				
Census stop	Topography	Vegetation type		No. of bird species
SL1	Floodplain	Sparse bluebush 60%	Open Coolibah shrub and grassland 40%	13
SL2	Floodplain and low dune	Open Coolibah woodland 80%	Tussock grassland with Whitewood 20%	12
SL3	Floodplain and low dunes	Open Coolibah woodland with lignum 40%	Lightly wooded dunes with tussock grassland 60%	14
SL4	Floodplain	Open Coolibah woodland with bluebush 100%		20
SL5	Floodplain with river channel. Low dunes	Floodplain with Coolibah and shrubs. River Redgum riparian strip 70%	Tussock grassland with open shrubland 30%	34
SL6	Gibber slopes grading to floodplain	Acacia woodland on floodplain. Riparian River Redgum and Coolibah 30%	Open grassland and herbs on gibber plains 60%	20
SL7	Stony rises and creek-line	Riparian River Redgum, Coolibah and <i>Acacia</i> sp. 25%	Open eremophila shrubland with sparse grasses and forbs 75%	14
SL8	Stony rises, gullies and mesas	Sparse eremophila and acacia shrubland with forbs and Mitchell Grass 100%		7
SL9	Stony rises dissected by creek-lines	Sparse eremophila and acacia shrubland with forbs and Mitchell Grass 90%	Riparian <i>Acacia</i> sp. 10%	12
SL10	Stony plains	Sparse Mitchell Grass and forbs 100%		4

C. FLORA

Since January 2015, 161 mm of rain was recorded at Innamincka township, 47 mm falling in April through to the end of June. However the patterns of emerging ephemeral forbs suggested that this rainfall was variable in the areas surveyed.

Both survey areas encountered two introduced species, *Acacia farnesiana* and Buffel Grass (*Cenchrus ciliaris*). Both were seen along the roadside and creek-lines. Their locations were recorded and the rangers notified. The impacts of invasive species are discussed further in Section G.

While birds were seen in all types of terrain and habitat, more birds were generally seen as the height and density of vegetation increased. This tended to occur either on the low dunes or along the creek-lines (Table 5).

1. Old Strzelecki Track – Coolibah Floodplain

The region around the Old Strzelecki Track to the south-west of Innamincka is essentially a floodplain of low open Coolibah woodland associated with the Strzelecki Creek. Included in the survey area were undulating sandplains and low rising pink dunes which dissected the 'gilgai' floodplain together with the occasional ephemeral channel and waterhole. The recent although variable rains had resulted in some areas containing abundant emergent annuals and forbs such as (*Senecio gregorii*) and



(*Blennodia canescens*), adding freshness and colour to an otherwise dry, grey landscape. Many of the eremophilas such as *Er. glabra* and wattles such as *Acacia ligulata* were also beginning to flower. In other areas the vegetation showed signs of desiccation particularly the dry mudflats or gilgai where water does not accumulate.

The main plant associations on the gilgai floodplain were Coolibah and chenopods, typically Golden Goosefoot (*Chenopodium auricomum*). On the larger waterholes a greater range of plant associations was seen with Coolibah, chenopods and eremophilas becoming more frequent. Plant associations on the dunes and swales were variable and far less obvious.

Descriptions of the floral communities are divided up into three habitat types: ephemeral waterholes and channels, sand ridges and swales, and low rises and mudflats or gilgai.

a. Ephemeral waterholes and channels

Only one large waterhole, Burlieburlye, which contained some remnant water was encountered on the survey. This waterhole was the most floristically complex and contained three to four layers of vegetation. The large fringing Coolibah (*Euc. coolabah*) and River Red Gum (*Euc. camaldulensis*) dominate the tree canopy. Moving away from the bank were scattered occasional shorter trees, including smaller Coolibah (*Euc. coolabah*), *Er.*

bignoniflora, *Er. longifolia*, *Atalaya hemiglauca* and *Santalum lanceolatum*.

A third understory layer included plants which were one to two metres high such as *Acacia victoriae*, *Eremophila glabra*, *Er. maculata*, *Muehlenbeckia florulenta*, *Maireana sp.* and *Atriplex sp.* A fourth ground layer, a half metre high or less included forbs such as *Sclerolaena lanicuspis*, *Sc. intricata*, *Salsola tragus*, *Enchylaena tomentosa*, *Tribulus terrestris*; tussock grasses such as *Aristida sp.* and bottle-washers

(*Enneapogon sp.*) and herbs such as

Senecio gregorii, *Blennodia canescens*, *Swainsona sp.* and *Erodium crinitum*. Ephemeral shallow channels were lined with sparse, stunted Coolibah (*Euc. coolabah*) and the occasional chenopod.



Burlieburly waterhole

b. Sand ridges and swales

The low rise pink sand ridges had variable cover both in terms of type and distribution reflecting to some extent the variable nature of the rainfall. The tops of the dunes were fairly broad with mild undulations, and contained a variety of scattered plants, including stands of hop bush (*Dodonea viscosa*), *Senna artemesoides*, *Acacia ligulata*, *Ac. murrayana*, and the occasional spinifex clump (*Triodia basedowii*) was



seen. On the lower slopes scattered *Senna sp.*, some *Croatalaria eremea* and the occasional *Acacia tetragonaphylla* and *Atriplex velutinella* were seen along with an isolated Queensland Bean-tree (*Lysiphyllum gilvum*). Both the tops and slopes contained patches of herbs such as *Senecio gregorii*, *Polycalymma stuartii*, *Ptilotus sessilifolius*, *Pt. polystachyus*, *Swainsona sp.* and *Sclerolaena sp.* Some of the erosion channels on the lower dune slopes contained *Eragrostis sp.*, *Calotis hispidula* and *Lepidium oxytrichum*.

c. Low rises and mudflats or gilgai

The low rises encountered had a scattered covering of *Atalaya hemiglauca* and some *Senna sp.* but one had an open stand of *Hakea leucoptera*. The gilgai or mudflats typically contained a sparse covering of low, stressed *Euc. coolabah*, with a sparse understory of *Chenopodium auricomum*, some *Atriplex velutinella*, *Muehlenbeckia florulenta* and some scattered *Sclerolaena sp.* including



Sclerolaena intricata, with the occasional *Eremophila glabra*, *Er. maculata*, *Acacia victoriae* and *Ac. tetragonophylla* in flower. A variety of sparsely scattered herbs was also seen, such as *Goodenia sp.*, *Bulbine semibabata*, *Swainsona sp.*, *Erodium crinitum*, *Blennodia canescens*, *Calotis hispidula*, *Nicotiana velutina*, *Euphorbia tanensis*, *Portulaca oleracea* and *Tribulus terrestris*. *Lechenaultia divaricata* was also seen along the road edge, although typically in a desiccated state.

2. Loop Track – The Gibber Rises and Mesas

The region to the north-east of Innamincka is known as the Merninie System and consists of two major landforms. Firstly, gibber flats and stony rises, and secondly mesas. These are dissected by generally dry channels or creek beds of varying sizes. The vast expanses of treeless gibber vary in size of stone and density of ground cover. This in turn affects the density of vegetation. Persistent winds and exposure to the elements on the open rises limits the overall growth to a metre or less in height, with most less than half that height. The irregular pattern of the ephemeral herbaceous species suggested that the recent rainfall recorded at Innamincka had not been wide spread and that further north and east, less rain appeared to have fallen.

The vegetation associations in this gibber region involve the edaphic complex of *Astrebla pectinata* – *Atriplex sp.* – *Sclerolaena sp.* Of these, the plant association of *Astrebla pectinata* and *Sclerolaena sp.* was frequently observed, particularly on the gibber flats. The steeper stony rises frequently showed associations of *Atriplex sp.* and *Sclerolaena sp.* Otherwise the plant associations were quite variable. The other loose plant association involved the fringing creeks and was between *Acacia cambagei*, *Ac. cyperophylla* and to a lesser extent *Eremophila sp.* However a variety of other plants were also observed in this habitat.

The floral communities are described under two main habitats: the first creek beds and watercourses, the second gibber flats and stony rises.

a. Creek beds and watercourses

Large creek beds were the most floristically complex containing three layers. The overstory was dominated by Gidgee (*Acacia cambagei*) but also contained Red Mulga (*Acacia cyperophylla*) and very occasionally some Coolibah (*Euc. coolabah*). The midstory frequently contained *Eremophila longifolia*, *Er. glabra*, *Acacia victoriae*, *Ac. Tetragonophylla* and *Senna artemesoides*. *Santalum lanceolatum* and *Scaevola spinescens* were both seen on



one occasion. In the sparse low understory, Windmill Grass (*Enteropogon asicularis*) and Mitchell Grass (*Astrebla pectinata*) were seen along with many varieties of chenopod such as *Sclerolaena sp.*, *Salsola tragus*, *Enchylaena tomentosa*, and the annual forbs such as Burr Daisy (*Calotis hispidula*), *Senecio gregorii* and *Blennodia canescens*. Small creek beds tended to contain two layers, a low overstory of Gidgee (*Acacia cambagei*) with perhaps some Red Mulga (*Ac. ceratophylla*) and a sparse ground layer of tussock grasses such as *Astrebla pectinata* and forbs such as *Sclerolaena sp.* Narrow watercourses and erosion channels were generally lined with low species such as *Er. freelingii* and *As. pectinata*.

b. Gibber flats and stony rises

The gibber flats and stony rises were sparsely covered with low vegetation, generally no more than a metre in height. The tallest plants were sparsely scattered acacia species such as *Ac. tetragonaphylla*, *Ac. victoriae* and some *Eremophila* sp. including *Er. glabra*. Below these were scattered chenopods such as *Atriplex fissivalvis*, *Maireana* sp., *Sclerolaena lanicuspis*, *Sc.intricata* and *Salsola tragus*. Amongst these were scattered *Sida* sp., *Abutilon otocarpum* as well as herbs such as *Goodenia* sp. and *Calotis* sp. On some of the lower slopes and gibber flats, open tussocks of Mitchell Grass (*As. pectinata*) and *Sclerolaena decurrens* were common. Other species included *Ptilotus sessiflora*, *Pt. obovata* and *Maireana aphylla*. Also where there had been recent rain, herbaceous annuals such as *Senecio gregorii* and *Blennodia canescens* were on display. At the furthest survey site from Innamincka, on a vast stony flat, small pockets of tiny herbs no more than 10 cm in height were trapped amongst the stones where water had managed to accumulate, forming scattered microcosms amongst otherwise sparse drying tussocks and forbs.



D. MAMMALS

1. Cattle

The entire area traversed by this survey is subject to cattle grazing.

Cattle grazing was heaviest along the Old Strzelecki Track (SL1-SL5), where cattle were observed at one census stop and recent signs noted at three other stops. The heaviest grazing was seen at SL1. Light to moderate grazing was recorded at all other census stops along the Old Strzelecki Track. Most transects in this area encountered cattle pads and other signs of cattle.



Evidence of grazing was much less at census stops along the Loop Track (SL6 – SL10). Cattle were grazing on the floodplain at SL6 and there were frequent cattle pads in this area. Old cattle scats were seen at all other census stops, mainly along or close to creek-lines.

2. Feral horse/donkey

Horse or donkey scats were recorded at the four census stops closest to Innamincka. In several cases these were territory marking mounds. No horses or donkeys were seen during the survey.

3. Rabbits

No rabbits were observed during the surveys. Rabbit scats and buck heaps were seen on SL7 and SL8. There were extensive rabbit warrens near the top of an eroded mesa at the junction of transects B and C on SL8 (see photo). The rabbits are making use of the softer white layer which is immediately below the hard cap of the mesa.

Rabbit scats or warrens were not recorded on other transects.



4. Fox

Foxes were not recorded on the survey.

5. Cat

Cats were not seen on the survey however feral cats were recorded at other times around the survey dates while within the Innamincka Regional Reserve. Cat tracks were recorded at SL5. Cats are a cryptic species and where direct observations do not reflect their actual numbers within the environment.

6. Dingo

The Dingo is a native species, now recognized as being a separate species of canid, distinct from the Grey Wolf of which it was previously regarded as a sub-species. Dingo were not seen at any of the census stops. Dingo tracks were recorded on the road at SL10 in gibber country.

Dingo numbers in the reserve were generally much lower than observed in previous survey years reflecting the bust which followed the boom of 2010-2013.

7. Kangaroo

Two Red Kangaroos were recorded at SL6. Small numbers of kangaroo tracks were recorded at SL2 and SL4 along the Old Strzelecki Track and at SL8 on the Loop Track. Kangaroo scats were recorded at SL5 and SL8. The kangaroo activity at SL8 was close to the mesas where they would have had shelter from the weather.

8. Other mammals

No other animals were seen on the survey. A few small rodent burrows (Long-haired Rat?) were recorded at SL3 and at SL8.

E. REPTILES AND AMPHIBIANS

No living reptiles were recorded during the survey. The skeleton of a Central Bearded Dragon, *Pogona vitticeps*, was found on the gibber plain at SL10 (see photo).

No amphibians were recorded.



F. ARCHEOLOGICAL SITES

The Innamincka area has a long history of human occupation which has left traces over much of the landscape.

Stone flakes and partially worked stones were found on clay surfaces at SL1 and SL2.

Grinding stones were found at SL2 and SL5.

The remains of old cattle yards on the eastern side of Strzelecki Creek on SL5 appear to date from the early pastoral period and may warrant further investigation. Pieces of cast iron found at SL2 may also be from that era.



G. THREATS AND POTENTIAL IMPACTING FACTORS

1. Soil Erosion

This year's survey covered two areas with very different geology and geomorphology.

a. The Old Strzelecki Track survey followed the floodplain of the Strzelecki Creek. Soils in this area lack strong structure and contain very low amounts of organic matter.

The floodplain soils consist of friable silt and clay. These soils crack on drying revealing a weak structure. In many areas there is a moderate to high salt content which prevents the formation of a more robust soil structure. When exposed, these soils are susceptible to wind and water erosion.

Higher areas consist of low dunes with sandy soils lacking structure. These have an underlying hard pan of compacted sand which is more resistant to erosion but is very slow to revegetate once exposed and remains exposed for a long time.

Soil erosion was not a significant problem at any of these survey sites, likely due to the intact vegetation with a good level of ground cover in most areas. This area is grazed and cattle were encountered at some census stops, but there were few well defined cattle tracks. Rabbits

are another potential contributor to erosion but no large rabbit warrens were encountered during this part of the survey.

b. The Loop Track runs in a north-easterly direction from Innamincka to the Queensland Border. This area consists of rising plains and mesas with tree-lined watercourses. The soil surface is rocky or stony except close to creeks where it sometimes has a layer of silt over the river gravels. In most areas the soil surface is protected by this mulch of stones which stops the wind removing the fine material beneath the stones.

Shot-lines created by the oil industry are the main cause of accelerated erosion in this area. These bulldozed straight lines across the landscape have created channels where water has been able to erode deep gullies on what would otherwise be stable slopes. Shot-lines were encountered at census stops SL7 and SL10. More distant erosion gullies could also be seen where shot-lines ran up the slopes of mesas.



Eroded shot-line at SL10

The only significant erosion caused by animals was encountered at census stop SL8 where there were extensive rabbit warrens on the upper slopes of a mesa.

This area is not subject to the same levels of grazing as other parts of the reserve. Cattle tracks were only encountered on the lower parts of census stop SL6 where the transects crossed the floodplain of Oonabrinta Creek.

2. Weeds

a. Buffel Grass

Buffel Grass infestations were found at two census stops.

Census stop SL5: Buffel Grass was present beside the Old Strzelecki Track near the census stop marker. Scattered plants were found along the road to the north towards Innamincka. This appeared to be close to the southernmost point of the infestation along the road but further surveying will be required. The eastern quadrant of the census stop extended across Strzelecki Creek. There was extensive Buffel Grass along the creek above the normal flood line and on the flats on the eastern side of the creek where it extended in all directions.

Census stop SL6: The eastern quadrant of this survey covered the area below the Loop Track and extended across Oonabrinta Creek. There was scattered Buffel Grass on the floodplain on either side of the creek. There was a dense infestation along both sides of the main creek channel. It was not possible to assess the extent of this infestation, however it is likely that it extends



Dense Buffel Grass lines both sides of Oonabrinta Creek

downstream towards the junction with Cooper Creek. It is also likely that this infestation extends upstream from this point.

Both infestations are extensive. It is likely that once Buffel Grass had reached the location, probably on vehicles, it spread downstream by flood waters and the movement of animals.

b. *Acacia farnesiana*

This shrub is known within the Innamincka Regional Reserve from locations along the Cordillo Road.

Census stop SL6: *Acacia farnesiana* was found on the floodplain of Oonabrinta Creek. Numerous shrubs, some up to 3 m tall and of similar diameter were found scattered amongst other *Acacia sp.* in areas that would be subject to flooding.

Census Stop SL7: A small plant of *A. farnesiana* was found on the banks of Oonabrinta Creek along transect A. It is probable that there are other plants in this area.



Acacia farnesiana

The limit of the infestation on Oonabrinta Creek was not determined. It would require a detailed survey of the entire creek-line in order to do this. Our findings indicate that this weed occurs along much of the length of Oonabrinta Creek with the highest level of infestation in the lower reaches, close to the junction with Cooper Creek. This distribution also indicates that once established, spread is assisted by movement in floods.

3. Feral animals

a. Horses and donkeys

The surveys found evidence that feral horses are present in the area (tracks and scats, see photographs in Appendix III, SL5), but currently at low numbers.

b. Rabbits

Rabbits are the most serious feral animal in the area. Burrows and grazing by rabbits are probably the greatest contributor to erosion within the Innamincka Regional Reserve.

Very little rabbit sign was detected during the course of the survey. This is likely to be a result of the recent very dry conditions. Rabbit numbers will build up rapidly under more favorable conditions.

c. Cats

Feral cat numbers boomed following the wet years of 2010-2011 when there was also a boom in the numbers of small mammals. Since then there has been a crash in the number of small animals and a corresponding reduction in feral cat numbers.

4. Mining, grazing and tourism development

a. Rubbish

Rubbish was not a major problem in the survey area, but low levels of rubbish were found at

most census stops. There was more rubbish found at census stops along the Old Strzelecki Track than along the Loop Track. This is likely to be the result of higher levels of use that this area gets.

The remains of old fencing materials were found at census stop SL6.

When found, small items of rubbish were collected by the volunteers for disposal at the Innamincka tip.

b. Oil drilling and associated roads and pipelines

There are several oil and gas exploration and production sites along the Old Strzelecki Track. The tracks and pipelines associated with these have modified the floodplain.

The impacts from oil exploration in this area have declined over the past two years as a result of the fall in oil and gas prices.

The Loop Track passes through the area where oil exploration started around Innamincka in 1959. Seismic surveys required the bulldozing of direct lines across the country for the placing of sensors and the firing of seismic shots. There are many shot-lines in this area which date from this period of early oil exploration. These shot-lines have since become focal points for accelerated water erosion resulting in deep gullies running directly down the slope of hills in this area.

c. Cattle grazing

Cattle grazing is having the greatest impact on the floodplains where it is more concentrated. Grazing removes much of the vegetation cover while the combination of loss of vegetation and breaking of the surface crust by hard hooves exposes these fragile soils to more rapid erosion.

The stony soils of the mesa country provide less food for cattle so are less intensively grazed. The surface covering of rocks helps protect soils from wind erosion but once broken, exposes the lower layers to increased erosion, particularly from water. Creek-lines in the mesa country provide more food for cattle but are more susceptible to erosion. Trees and shrubs along creek-lines are also damaged by excessive grazing.

5. Vehicle tracks

Informal vehicle tracks were encountered at most census stops along the Old Strzelecki Track. The reasons for these tracks was varied but would include station or mining use, tourists leaving the main road and bypass tracks around wet areas.

There were fewer informal tracks along the Loop Track. Those that were encountered appeared to be connected to station use.

Informal tracks break the soil crust and open the soil to accelerated erosion from both wind and water.

6. Fire

None of the census stops in this year's survey had evidence of recent fires.

7. Irrigation and water use

This area is part of the Cooper Floodplain and will inevitably be affected by any changes to the water regime in Cooper Creek. Current plans to increase irrigation in the Queensland section of the Cooper Catchment are a major threat to this area.

CONCLUSIONS

The greatest richness in birdlife was found on the floodplains and riparian areas. These areas are more fertile due to the nutrient transfer by floods which occur at irregular intervals. The presence of large trees close to waterways grading back to smaller trees, shrubs and grassland as the topography rises creates a more diverse habitat. The trees provide habitat elements such as hollows for nesting. The more diverse habitat also provides greater feeding opportunities for birds as there are more seeds and insects available here than in the stony rises.

The stony rises, gibbers and mesas, along the Loop Track are a very harsh habitat. Most birds were associated with the riparian woodlands which provided the necessary habitat for most species that were present.

The presence of Gibberbirds seen while travelling to census stop SL9 shows that this habitat is used by some arid zone specialists. It is also likely that some species e.g. small raptors and grassland birds will make opportunistic use of this habitat when conditions are favorable. The small cliffs and caverns around the mesas may also provide habitat for species that use this type of environment.

In 2013 FOIR established a survey method which could be used to monitor the impacts of both short- and long-term changes in environmental conditions on populations of bird, mammal and vegetation species along an 80 km span of the Bore Track North. This methodology was used by FOIR volunteers in 2014 to survey the Coongie Road and now again in 2015 to survey the Old Strzelecki and Loop Tracks. It is suggested that a similar survey be undertaken in 2016 within the Innamincka Regional Reserve, incorporating the McQuilpie country along the northern Cordillo Road.

The survey data and information provide a valuable resource for development of management plans for the region.

It is recommended that repeat surveys are conducted at least every 5 years. This will enable comparisons between surveys with the opportunity to detect trends in wildlife numbers and habitat condition.

APPENDIX I – LOCATION OF CENSUS STOPS

A. CENSUS STOP AND SURVEY POINT CO-ORDINATES

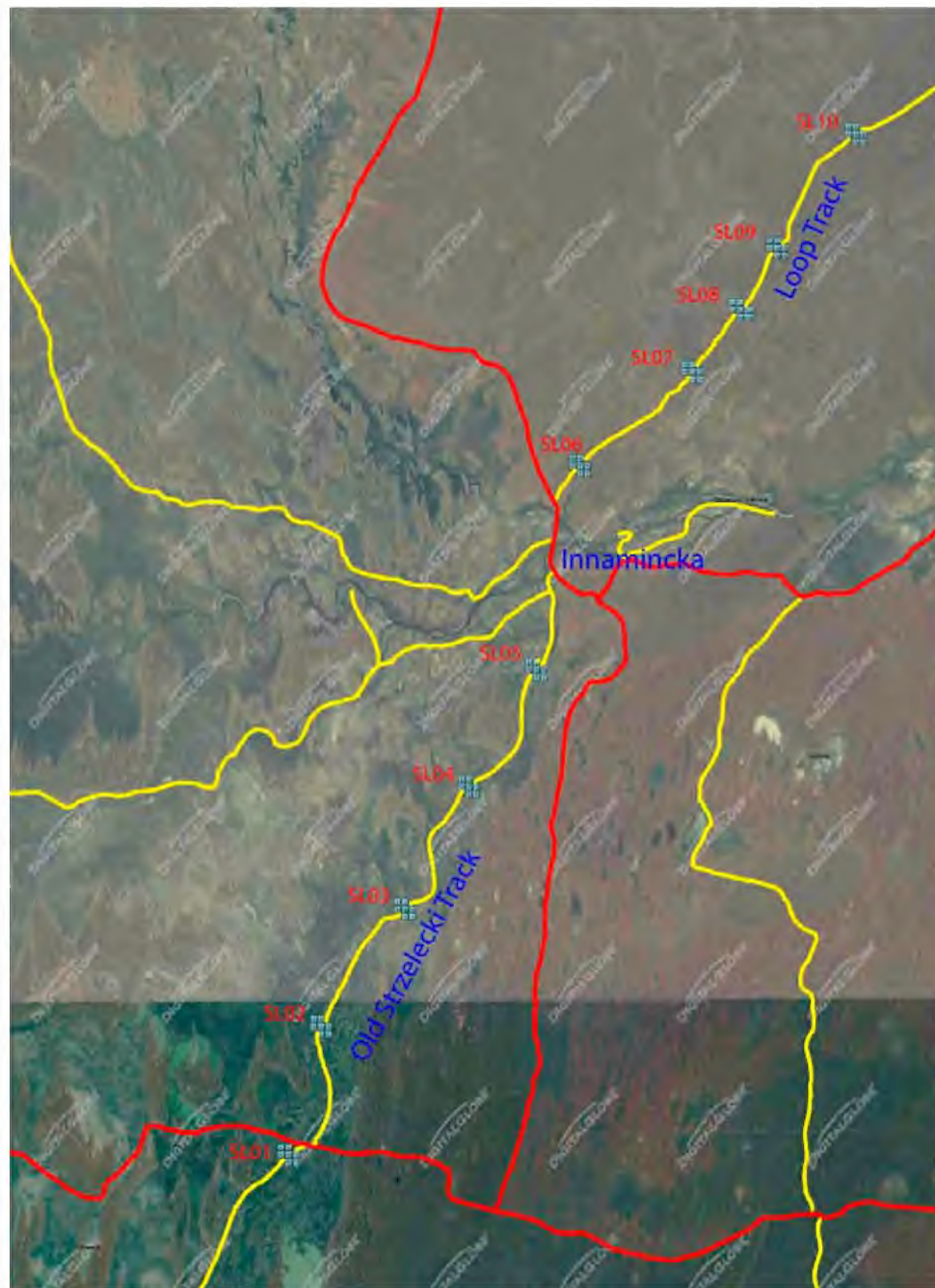
The following table lists all co-ordinates for each census stop. The co-ordinate system used is UTM. The census stops are also shown on the following Map.

Census Stop	Corner Point	AMG zone	Easting	Northing
SL1	1	54J	456197	6892122
	2	54J	456697	6892122
	3	54J	456697	6891622
	4	54J	456197	6891622
	5	54J	455697	6892122
	6	54J	455697	6892622
	7	54J	455197	6892622
SL2	1	54J	458418	6900714
	2	54J	458918	6900714
	3	54J	458918	6900214
	4	54J	458418	6900214
	5	54J	457918	6900714
	6	54J	457918	6901214
	7	54J	458418	6901214
SL3	1	54J	464013	6908576
	2	54J	464513	6908576
	3	54J	464513	6908076
	4	54J	464013	6908076
	5	54J	463513	6908576
	6	54J	463513	6909076
	7	54J	464013	6909076
SL4	1	54J	468316	6916675
	2	54J	468816	6916675
	3	54J	468816	6916175
	4	54J	468316	6916175
	5	54J	467816	6916675
	6	54J	467816	6917175
	7	54J	468316	6917175
SL5	1	54J	472788	6924481
	2	54J	473288	6924481
	3	54J	473288	6923981
	4	54J	472788	6923981
	5	54J	472288	6924481
	6	54J	472288	6924981
	7	54J	472788	6924981

Census Stop	Corner Point	AMG zone	Easting	Northing
SL6	1	54J	475692	6938086
	2	54J	476192	6938086
	3	54J	476192	6937586
	4	54J	475692	6937586
	5	54J	475192	6938086
	6	54J	475192	6938586
	7	54J	475692	6938586
SL7	1	54J	483491	6944210
	2	54J	483991	6944210
	3	54J	483991	6943710
	4	54J	483491	6943710
	5	54J	482991	6944210
	6	54J	482991	6944710
	7	54J	483491	6944710
SL8	1	54J	486668	6948365
	2	54J	487168	6948365
	3	54J	487168	6947865
	4	54J	486668	6947865
	5	54J	486168	6948365
	6	54J	486168	6948865
	7	54J	486668	6948865
SL9	1	54J	489000	6952474
	2	54J	489500	6952474
	3	54J	489500	6951974
	4	54J	489000	6951974
	5	54J	488500	6952474
	6	54J	488500	6952974
	7	54J	489000	6952974
SL10	1	54J	494261	6960067
	2	54J	494761	6960067
	3	54J	494761	6959567
	4	54J	494261	6959567
	5	54J	493761	6960067
	6	54J	493761	6960567
	7	54J	494261	6960567

Map showing Census Stop Locations along the Old Strzelecki and Loop Tracks

Source: VantagePoint™/DigitalGlobe™ overlaid with FOIR transect square coordinates



Key

Major roads



Minor roads



10 km



APPENDIX II - BIRD SURVEY DATA

Date and time	Census Stop	Species	Seen/ Heard	Number	GPS
01/08/2015	SL1	Australian Raven	Seen	4	54 J
St. 08:10		Black-faced Woodswallow	Seen	14	456197E
Fin. 09:25		Brown Falcon	Seen	1	6892122N
		Budgerigar	Seen	114	
		Cinnamon Quail-thrush	Seen	1	
		Crested Pigeon	Seen	1	
		Galah	Seen	3	
		Horsfield's Bronze Cuckoo	Seen	1	
		Little Corella	Seen	2	
		Magpie-lark	Seen	1	
		Nankeen Kestrel	Seen	2	
		White-plumed Honeyeater	Seen	1	
		Zebra Finch	Seen	32	

01/08/2015	SL2	Australian Raven	Seen	1	54J
St. 09:55		Black-faced Woodswallow	Seen	16	458418E
Fin. 10:56		Budgerigar	Seen	26	6900714N
		Chirruping Wedgebill	Seen	1	
		Crested Pigeon	Seen	1	
		Crimson Chat	Seen	4	
		Crow or Raven sp.	Seen	5	
		Emu	Seen	2	
		Galah	Seen	6	
		Red-browed Pardalote	Seen	1	
		Singing Honeyeater	Seen	4	
		Zebra Finch	Seen	6	

01/08/2015	SL3	Australian Magpie	Seen	3	54J
St. 15:50		Babbler sp.	Seen	8	0464013E
Fin. 17:24		Black Falcon	Seen	1	6908576N
		Black-faced Woodswallow	Seen	19	
		Brown Falcon	Seen	1	
		Budgerigar	Seen	137	
		Crimson Chat	Seen	32	
		Galah	Seen	5	
		Little Crow	Seen	20	
		Rufous Whistler	Seen	1	
		Singing Honeyeater	Seen	3	
		White-winged Fairywren	Seen	1	
		Willie Wagtail	Seen	6	
		Zebra Finch	Seen	14	

02/08/2015	SL4	Australian Magpie	Seen	1	54J
St. 07:53		Australian Pipit	Seen	1	468316E
Fin. 09:20		Australian Raven	Seen	25	6916675N
		Babbler sp.	Seen	21	
		Black-faced Woodswallow	Seen	1	
		Brown Falcon	Seen	25	
		Budgerigar	Seen	1	
		Cinnamon Quail-thrush	Seen	2	
		Cockatiel	Seen	14	
		Crested Pigeon	Seen	2	
		Crimson Chat	Seen	6	
		Galah	Seen	1	
		Nankeen Kestrel	Seen	1	
		Red-browed Pardalote	Seen	5	
		Tree Martin	Heard	1	
		White-plumed Honeyeater	Seen	9	
		White-winged Fairywren	Seen	4	
		Willie Wagtail	Seen	3	
		Yellow-throated Miner	Seen	16	
		Zebra Finch	Seen	1	

02/08/2015	SL5	Australian Raven	Seen	3	54J
St. 09:50		Babbler sp.	Seen	5	472788E
Fin. 11:30		Black Kite	Seen	5	6924481N
		Black-faced Cuckooshrike	Seen	1	
		Black-faced Woodswallow	Seen	13	
		Bourke's Parrot	Seen	2	
		Brolga	Seen	2	
		Budgerigar	Seen	9	
		Chirruping Wedgebill	Seen	2	
		Cockatiel	Seen	7	
		Crested Pigeon	Seen	5	
		Crimson Chat	Seen	10	
		Crow or Raven sp.	Seen	11	
		Diamond Dove	Seen	1	
		Galah	Seen	5	
		Glossy Ibis	Seen	1	
		Horsfield's Bronze Cuckoo	Seen	3	
		Little Corella	Seen	168	
		Nankeen Kestrel	Seen	2	
		Pacific Black Duck	Seen	15	
		Peaceful Dove	Seen	2	
		Red-backed Kingfisher	Seen	1	

		Red-browed Pardalote	Seen	3	
		Rufous Songlark	Seen	6	
		Singing Honeyeater	Seen	1	
		Spiny-cheeked Honeyeater	Seen	2	
		Tree Martin	Seen	1	
		Whistling Kite	Seen	2	
		White-faced Heron	Seen	1	
		White-plumed Honeyeater	Seen	18	
		White-winged Fairywren	Seen	1	
		Willie Wagtail	Seen	2	
		Yellow-throated Miner	Seen	6	
		Zebra Finch	Seen	35	

03/08/2015	SL6	Black-faced Cuckooshrike	Seen	1	54J
St. 15:23		Black-faced Woodswallow	Seen	1	475692E
Fin. 17:00		Bourke's Parrot	Seen	2	6938086N
		Budgerigar	Seen	14	
		Crested Pigeon	Seen	5	
		Crimson Chat	Seen	12	
		Galah	Seen	5	
		Grey Shrikethrush	Seen	1	
		Little Corella	Seen	355	
		Little Crow	Seen	4	
		Nankeen Kestrel	Seen	1	
		Rufous Whistler	Seen	1	
		Singing Honeyeater	Seen	10	
		Spiny-cheeked Honeyeater	Seen	6	
		Striated Pardalote	Seen	2	
		Tree Martin	Seen	1	
		Variegated Fairywren	Seen	3	
		White-plumed Honeyeater	Seen	8	
		Willie Wagtail	Seen	2	
		Zebra Finch	Seen	23	

03/08/2015	SL7	Australian Magpie	Seen	2	54J
St. 13:04		Australian Raven	Seen	3	483491E
Fin. 14:44		Black-eared Cuckoo	Seen	1	6944210N
		Black-faced Woodswallow	Seen	1	
		Crested Pigeon	Seen	1	
		Grey Butcherbird	Seen	1	
		Little Corella	Seen	62	
		Little Crow	Seen	1	
		Nankeen Kestrel	Seen	1	
		Singing Honeyeater	Seen	4	
		Spiny-cheeked Honeyeater	Seen	2	

		Thornbill sp.	Seen	1	
		Wedge-tailed Eagle	Seen	4	
		White-plumed Honeyeater	Seen	2	

03/08/2015	SL8	Black-faced Woodswallow	Seen	18	54J
St. 09:45		Crimson Chat	Seen	10	486668E
Fin. 11:25		Little Crow	Seen	3	6948365N
		Pied Honeyeater	Seen	1	
		Singing Honeyeater	Seen	6	
		White-winged Fairywren	Seen	4	
		Zebra Finch	Seen	77	

03/08/2015	SL9	Australian Hobby	Seen	1	54J
St. 09:45		Australian Magpie	Seen	3	489000E
Fin. 11:13		Babbler sp.	Seen	1	6952474N
		Black-faced Cuckooshrike	Seen	5	
		Black-faced Woodswallow	Seen	6	
		Bourke's Parrot	Seen	7	
		Crested Pigeon	Seen	3	
		Crimson Chat	Seen	4	
		Galah	Seen	1	
		Singing Honeyeater	Seen	10	
		Willie Wagtail	Seen	2	
		Zebra Finch	Seen	7	

02/08/2015	SL10	Australian Magpie	Seen	1	54J
St. 15:45		Australian Raven	Seen	1	494261E
Fin. 17:06		Cockatiel	Seen	1	6960067N
		Falcon sp.	Seen	1	
		Nankeen Kestrel	Seen	1	

APPENDIX III - PHOTOGRAPHIC AND HABITAT RECORDS

Original photographs are available from FOIR for analysis if required.

Census stop SL1












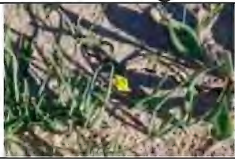

Date: 01-08-2015


















Commenced: 08:05

Weather: Fine, sunny, light breeze from NW

Number of observers: 6

Habitat: Sparse gilgai, bluebush, Coolibah floodplain

Corner point 1	Right: 	Left: 		
	Habitat: Sparse gilgai, bluebush, Coolibah floodplain			
Transect A				
	<i>Calotis plumulifera</i>			
Corner point 2	Right: 	Left: 		
	Habitat: Gilgai with very sparse bluebush			
Transect B				
	<i>Atriplex sp</i>	<i>Euphorbia stevenii</i>	<i>Gnephosis eriocarpa</i>	<i>Sclerolaena bicornis</i>
Corner point 3	Right: 	Left: 		
	Habitat: Gilgai with very sparse bluebush			
Transect C				
	<i>Goodenia lunata</i> and <i>Bulbine alata</i>	<i>Eremophila maculata</i>		




















Corner point 4	Right: 	Left: 		
	Habitat: Sparse gilgai, bluebush, Coolibah floodplain			
Transect D				
	Stone flake	<i>Erodium crinitum</i>	<i>Zygophyllum iodocarpum</i>	<i>Podaxis pistalaris</i>
Transect E				
	<i>Erodium crinitum</i>	Acacia shrubland	Acacia shrubland	
Corner point 5	Right: 	Left: 		
	Habitat: Sparse <i>Hakea leucoptera</i> , dry tussock, <i>Bauhinia gilva</i>			
Transect F				
	<i>Senecio gregorii</i>	<i>Atalaya hemiglauc</i> , Whitewood		
Corner point 6	Right: 	Left: 		
	Habitat: Sparse <i>Senna</i> , Coolibah woodland			
Transect G	No photos			
Corner point 7	Right: 	Left: 		
	Habitat: Bluebush, gilgai floodplain			
Transect H	No photos			



















Census stop SL2 Date: 1-08-2015 Commenced: 09:55








Weather: Fine, sunny, moderate breeze from the N

Number of observers: 6

Habitat: Coolibah floodplain

Corner point 1	Right: 	Left: 		
	Habitat: Coolibah floodplain			
Transect A				
	<i>Bulbine alata</i>	<i>Bulbine alata</i>	<i>Calotis plumulifera</i>	Mixed acacia shrubland
				
	<i>Blennodia</i> and <i>Calotis</i> herbfield	<i>Blennodia canescens</i>		
Corner point 2	Right: 	Left: 		
	Habitat: Floodplain with saltbush and Coolibah			
Transect B				
	Emu	<i>Goodenia lunata</i>	<i>Calotis plumulifera</i>	<i>Tephrosia</i> sp.
				
	<i>Gnephosis eriocarpa</i>	<i>Eremophila maculata</i>	<i>Stenopetalum nutans</i>	
Corner point 3	Right: 	Left: 		
	Habitat: Floodplain with saltbush and Coolibah			

Transect C				
	<i>Goodenia lunata</i>	<i>Goodenia lunata</i>	Cast iron relics	Survey marker, relics and track
				
	Unidentified subshrub	Old survey (unknown) marker	<i>Ptilotus polystachyus</i>	<i>Ptilotus polystachyus</i>
Corner point 4	Right: 	Left: 		
Habitat: Dune with Whitewood and tussock grasses				
Transect D				
	Stone flakes	Grinding stone	<i>Lepidium stronglylophyllum</i>	<i>Lepidium stronglylophyllum</i>
				
	Old survey (unknown) marker			
Transect E				
	<i>Bulbine alata</i>			
Corner point 5	Right: 	Left: 		
Habitat: Sparse Coolibah, bluebush floodplain				













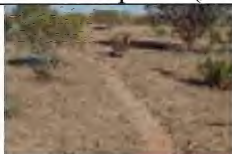





Transect F				
	<i>Erodium crinitum</i>	<i>Acacia sp.</i>		
Corner point 6	Right: 	Left: 		
	Habitat: Denser Coolibah woodland (low)			
Transect G	No photos			
Corner point 7	Right: 	Left: 		
	Habitat: Sparse bluebush, entering small stand of Coolibah			
Transect H				
	<i>Calotis plumulifera</i>			















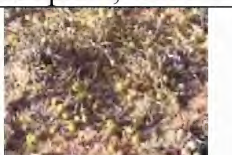






Census stop SL3 Date: 1-08-2015 Commenced: 15:50

























Weather: Fine, sunny, moderately strong breeze from the N

Number of observers: 6

Habitat: Dune, lightly wooded (Whitewood)

Corner point 1	Right: 	Left: 		
	Habitat: Dune, sandplain			
Transect A				
	<i>Swainsona oroboides</i> complex	<i>Rhodanthe moschata</i>	Whitewood and Hakea shrubland	<i>Hakea leucoptera</i>
				
	<i>Hakea leucoptera</i>	<i>Acacia tetragonophylla</i> , Dead Finish	<i>Ptilotus polystachyus</i>	
Corner point 2	Right: 	Left: 		
	Habitat: Lightly wooded sandplain (75% ground cover)			
Transect B				
	<i>Lysiana exocarpi</i>	Cattle pad	<i>Goodenia havilandii</i>	<i>Senna artemisioides</i>
				
	Ephemeral seedlings	<i>Lepidium stronglyllophyllum</i>	<i>Enchylaena tomentosa</i> , Ruby Saltbush	

Corner point 3	Right: 	Left: 		
	Habitat: Floodplain with Coolibah, lignum (ground cover ~65%)			
Transect C				
	<i>Maireana aphylla</i>	<i>Maireana aphylla</i>		
Corner point 4	Right: 	Left: 		
	Habitat: Dune, sandplain			
Transect D				
	<i>Acacia ligulata</i>	<i>Acacia ligulata</i>		
Transect E				
	<i>Atriplex nummularia</i>	Sandplain with Whitewood	<i>Eu. coolabah</i> regeneration	
Corner point 5	Right: 	Left: 		
	Habitat: Coolibah, floodplain, woodland			
Transect F				
	<i>Goodenia fascicularis</i>	<i>Gnephosis eriocarpa</i>	<i>Swainsona campylantha</i>	<i>Calotis plumulifera</i>
				
	<i>Eucalyptus coolabah</i>	<i>Podaxis pistillaris</i>	<i>Eremophila maculata</i>	<i>Eremophila maculata</i>

Corner point 6	Right: 	Left: 		
	Habitat: Slow rise, very sparse bluebush, Coolibah			
Transect G				
	Herbfield on low dune	<i>Swainsona campylantha</i>	<i>Senecio gregorii</i>	<i>Senecio gregorii</i>
				
	<i>Ptilotus sessilifolius</i>	Sandplain with good vegetation	<i>Rhodanthe moschata</i>	<i>Ptilotus polystachyus</i>
				
	Erosion scar	Sandplain	<i>Dodonea viscosa</i> shrubland	
Corner point 7	Right: 	Left: 		
	Habitat: Dune slope covered in hop bush, <i>Senna</i>			
Transect H				
	<i>Polycalymma stuartii</i>	<i>Acacia tetragonophylla</i> , Dead Finish	Regenerating herbs in water channel	<i>Triraphis mollis</i>
				
	<i>Eragrostis</i> sp.	<i>Senna artemisioides</i>	<i>Atr. holocarpa</i> , Pop Saltbush	<i>Senecio gregorii</i> sandplain
				
	<i>Lepidium strongylophyllum</i>			

Census stop SL4
















Date: 2-08-2015














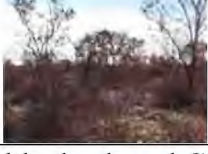
Commenced: 07:53



Weather: Fine, mild, no breeze

Number of observers: 6

Habitat: Floodplain with Coolibah and lignum

Corner point 1	Right: 	Left: 		
Habitat: Floodplain with Coolibah and lignum				
Transect A				
	<i>Atriplex nummularia</i>	<i>Eucalyptus coolabah</i> regeneration	<i>Eremophila maculata</i>	<i>Stenopetalum nutans</i>
				
	<i>Swainsona flavicarinata</i>	<i>Swainsona flavicarinata</i>		
Corner point 2	Right: 	Left: 		
Habitat: Floodplain with Coolibah and lignum				
Transect B				
	Floodplain with bluebush and Coolibah	Unidentified subshrub	Unidentified subshrub	
Corner point 3	Right: 	Left: 		
Habitat: Floodplain with Coolibah and lignum (~50% bare ground)				

Transect C				
	<i>Zygodium iodocarpum</i>	<i>Bulbine alata</i>		
Corner point 4	Right: 	Left: 		
	Habitat: Sandplain with tussock grassland and scattered bluebush			
Transect D	No photos			
Transect E	No photos			
Corner point 5	Right: 	Left: 		
	Habitat: Coolibah, bluebush floodplain			
Transect F				
	<i>Eremophila bignoniiflora</i>	<i>Atriplex nummularia</i> Old Man Saltbush		
Corner point 6	Right: 	Left: 		
	Habitat: Bluebush, Coolibah floodplain			
Transect G				
	<i>Atriplex nummularia</i>	<i>Crinum flaccidum</i> Darling Lily		
Corner point 7	Right: 	Left: 		
	Habitat: Floodplain, bluebush and Coolibah			

Transect H				
	<i>Lechenaultia divaricata</i>	<i>Eremophila maculata</i>		

Census stop SL5


















Date: 2-08-2015


























Commenced: 09:50












Weather: Fine, sunny, light breeze

Number of observers: 6

Habitat: Coolibah floodplain, scattered Eremophila

Corner point 1	Right: 	Left: 		
Habitat: Floodplain, Coolibah, scattered Eremophila				
Transect A				
	<i>Lysiphyllum gilvum</i>	Riparian woodland	Strzelecki Creek	Lightly wooded sandplain
				
	Lightly wooded sandplain	Locust	Coolibah woodland with Buffel Grass	
Corner point 2	Right: 	Left: 		
Habitat: Coolibah floodplain				
Transect B				
	Cattle track through Coolibah woodland	Coolibah woodland floodplain	Coolibah woodland floodplain	Buffel Grass infestation, Coolibah woodland
Corner point 3	Right: 	Left: 		
Habitat: Sandplain, lightly wooded (Whitewood, Coolibah), ground cover ~80%, tussock, daisies				

Transect C				
	Post & rail fence	Grinding stone	Burlieburly W/H	<i>Wahlenbergia sp.</i>
Corner point 4	Right: 	Left: 		
	Habitat: Riparian woodland and floodplain			
Transect D	No photos			
Transect E				
	Lower dune slopes	<i>Senecio gregorii</i> herbfield	Whitewood on dune	<i>Triodia sp.</i> and <i>Acacia sp.</i>
				
	<i>Crotalaria eremaea</i>	Acacia shrubland on dune		
Corner point 5	Right: 	Left: 		
	Habitat: Dune slope, <i>Acacia murrayana</i> , <i>Dodonea</i> , <i>Senna</i> and <i>Senecio gregorii</i>			
Transect F				
	<i>Senecio gregorii</i>	Claypan	Vehicle tracks on dune	Donkey scats
				
	Herbfield on dune	<i>Senecio gregorii</i>	<i>Amyema preissii</i> on <i>Acacia sp.</i>	Possible cat tracks
				
	Kangaroo scats	<i>Goodenia sp.</i>	<i>Acacia ligulata</i>	

Corner point 6	Right: 	Left: 		
Habitat: Dune crest, <i>Acacia ligulata</i> , <i>Acacia victoriae</i> , Santos view (distant)				
Transect G				
	<i>Lysiphyllum gilvum</i>	Floodplain	Kangaroo scats	Floodplain
Corner point 7	Right: 	Left: 		
Habitat: Coolibah floodplain				
Transect H				
	Kangaroo scats	<i>Eremophila glabra</i>	<i>Bulbine alata</i>	

Census stop SL6













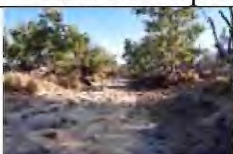
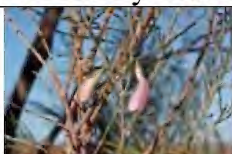






Date: 03-08-2105













Commenced: 15:23

Weather: Fine, sunny, moderate breeze

Number of observers: 6

Habitat: Gibber plain with creek-line

Corner point 1	Right: 	Left: 		
	Habitat: Gibber plain			
Transect A				
	Oonabrinta Creek floodplain	<i>Stenopetalum nutans</i>	<i>Calocephalus platycephalus</i>	<i>Santalum lanceolatum</i>
				
	<i>Acacia farnesiana</i>	<i>Lysiana exocarpi</i>	<i>Eremophila latrobei</i>	Dead acacia and Buffel Grass
Corner point 2	Right: 	Left: 		
	Habitat: Floodplain with mainly dead acacia			
Transect B				
	Oonabrinta Creek	<i>Eremophila dalyana</i>		
Corner point 3	Right: 	Left: 		
	Habitat: Gibber plain with moderate cover of forbs and grasses			
Transect C				
	Oonabrinta Creek	Buffel Grass	<i>Acacia cyperophylla</i> , Red Mulga	















Corner point 4	Right: 	Left: 		
	Habitat: Open herbfield with scattered Buffel Grass			
Transect D	No photos			
Transect E				
	Herbfield on gibber plain			
Corner point 5	Right: 	Left: 		
	Habitat: Gibber plain with scattered grasses and forbs			
Transect F				
	Gibber plain with ephemeral water course			
Corner point 6	Right: 	Left: 		
	Habitat: Undulating gibber plain crossed with creeks lined with acacia			
Transect G	No photos			
Corner point 7	Right: 	Left: 		
	Habitat: Gibber plain with scattered forbs			
Transect H				
	Gibber plain and bore marker	<i>Atriplex holocarpa</i> , Pop Saltbush		

















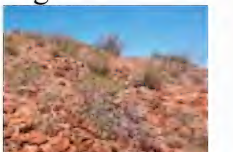

Census stop SL7 Date: 03-08-2015 Commenced: 13:25







Weather: Fine, moderate breeze

Number of observers: 6

Habitat: Stony rises, creek-lines with acacia, Coolibah

Corner point 1	Right: 	Left: 		
Habitat: Stony rises with sparse vegetation				
Transect A				
	<i>Eucalyptus camaldulensis</i> along Oonabrinta Creek	<i>Ptilotus macrocephalus</i>	<i>Acacia tetragonophylla</i> , Dead Finish	<i>Acacia tetragonophylla</i> , Dead Finish
				
	<i>Acacia farnesiana</i>	Red Mulga riparian woodland		
Corner point 2	Right: 	Left: 		
Habitat: Red Mulga riparian woodland and gibber plain				
Transect B				
	<i>Hibiscus brachysiphonius</i>	<i>Acacia cyperophylla</i> , Red Mulga	<i>Astrebla pectinata</i>	<i>Astrebla pectinata</i>

Corner point 3	Right: 	Left: 		
Habitat: Gibber plain				
Transect C				
	Shot-line	<i>Capparis mitchellii</i>		
Corner point 4	Right: 	Left: 		
Habitat: Riparian woodland and gibber plain				
Transect D				
	Oonabrinta Creek	<i>Rhodanthe microglossa</i>	<i>Abutilon halophilum</i>	<i>Frankenia serpyllifolia</i>
Transect E				
	Oonabrinta Creek catchment	<i>Eremophila freelingii</i>		
Corner point 5	Right: 	Left: 		
Habitat: Stony ridge across creek-line with acacia				
Transect F				
	Stony rises with limestone outcrop	Stony rises		
Corner point 6	Right: 	Left: 		
Habitat: Stony fall and rise, sparse acacia				























Transect G				
	Oonabrinta Valley	<i>Maireana microcarpa</i>		
Corner point 7	Right: 	Left: 		
Habitat: Stony undulations with dead stubble				
Transect H				
	Flint	<i>Scaevola spinescens</i>		




















Census stop SL8 Date: 02-08-2015 Commenced: 09:45








Weather: Sunny, moderate breeze, cool

Number of observers: 6

Habitat: Stony rises, Mitchell Grass

Corner point 1	Right: 	Left: 		
Habitat: Stony rises, Mitchell Grass				
Transect A				
	<i>Ptilotus macrocephalus</i>	Stony rises	<i>Scaevola spinescens</i>	<i>Scaevola spinescens</i>
				
	Small mammal or reptile burrow	<i>Amyema miraculosum</i>	<i>Santalum</i> with mistletoe	<i>Atriplex spongiosa</i>
				
	<i>Maireana campanulata</i>			
Corner point 2	Right: 	Left: 		
Habitat: Stony rises, Mitchell Grass				
Transect B				
	<i>Ptilotus macrocephalus</i>	Mesa	Rabbit pellets	Rabbit warren
				
	<i>Maireana campanulata</i>	Limestone layer	Lichen	Green lichen

				
	Unidentified shrub	Limestone layer in mesa	Watermarks under limestone overhang	<i>Eremophila freelingii</i>
Corner point 3	Right: 	Left: 		
Habitat: Stony rises and mesas				
Transect C				
	<i>Eremophila latrobei</i>	<i>Eremophila latrobei</i>	Mesa 	Landscape with shot-line
				
	Small animal burrow	Kangaroo scats	Kangaroo scats	
Corner point 4	Right: 	Left: 		
Habitat: Stony rises and mesas with Mitchell Grass				
Transect D	No photos			
Transect E				
	Kangaroo tracks			
Corner point 5	Right: 	Left: 		
Habitat: Stony rise with creek filled with mulga				
Transect F	No photos			

Corner point 6	Right: 	Left: 		
Habitat: Stony rise with bluegrass and saltbush tussocks				
Transect G				
	Erosion at shot-line	Stony rises		
Corner point 7	Right: 	Left: 		
Habitat: Stony down-hill slope and mesa with creek-line				
Transect H				
	Creek-line and mesa			

Census stop SL9

















Date: 03-08-2015















Commenced: 07:45

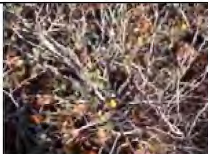


Weather: Sunny, light breeze from the south

Number of observers: 6

Habitat: Stony plain, tussock grass

Corner point 1	Right: 	Left: 		
Habitat: Stony plain with Mitchell Grass and forbs				
Transect A				
	Mitchell Grass plain	Creek-line with mulga		
Corner point 2	Right: 	Left: 		
Habitat: Stony plain and ephemeral creek-line with mulga				
Transect B				
	<i>Arabidella eremigena</i>	Kangaroo scats	Mitchell Grass plain	Mitchell Grass plain
Corner point 3	Right: 	Left: 		
Habitat: Stony plain with Mitchell Grass				
Transect C				
	<i>Arabidella eremigena</i>	Acacia and Coolibah along creek-line	<i>Abutilon sp.</i>	<i>Eremophila obovata</i> var. <i>obovata</i>

				
	Mixed acacia and <i>Santalum</i> along creek-line	<i>Maireana microcarpa</i>		
Corner point 4	Right: 	Left: 		
Habitat: Mitchell Grass stony plain				
Transect D	No photos			
Transect E				
	Stony plain	Mixed <i>Acacia</i> sp.	Red Mulga and <i>Santalum</i> along creek	<i>Acacia cyperphylla</i> , Red Mulga
				
Stony plain, tussock grass (Mitchell Grass)				
Corner point 5	Right: 	Left: 		
Habitat: Stony plain/rise with tussock (dried)				
Transect F				
	Red Mulga along creek			
Corner point 6	Right: 	Left: 		
Habitat: Stony plain, tussock grass (Mitchell Grass)				

















Transect G				
	<i>Sida fibulifera</i>			
Corner point 7	Right: 	Left: 		
	Habitat: Stony rise with Mitchell Grass tussocks			
Transect H	No photos			














Census stop SL10 Date: 2-08-2015 Commenced: 15:45

Weather: Fine, mild, stiff breeze

Number of observers: 6

Habitat: Gibber plain, sparse grassland

Corner point 1	Right: 	Left: 		
Habitat: Gibber plain, sparse grassland, 75% bare ground				
Transect A				
	Old survey (unknown) marker	Mitchell Grass gibber plains	<i>Lepidium strongylophyllum</i>	
Corner point 2	Right: 	Left: 		
Habitat: Gibber plain, sparse grassland, 75% bare ground				
Transect B				
	Unusual patch of black rock fragments		Shot-line erosion	
Corner point 3	Right: 	Left: 		
Habitat: Gibber plain, sparse grassland, 75% bare ground				
Transect C				
	Unidentified herb	Shot-line		
Corner point 4	Right: 	Left: 		
Habitat: Gibber plain, sparse grassland, 75% bare ground				

Transect D				
	Clay deposit in gibber plain			
Transect E				
	<i>Enchylaena tomentosa</i> and <i>Atriplex holocarpa</i>			
Corner point 5	Right: 	Left: 		
	Habitat: Gibber plain, sparse dead forbs			
Transect F				
	<i>Euphorbia stevenii</i>	<i>Lepidium strongylophyllum</i>	<i>Lepidium strongylophyllum</i>	<i>Harmsiodoxa blennodioides</i>
Corner point 6	Right: 	Left: 		
	Habitat: Gibber plain			
Transect G	No photos			
Corner point 7	Right: 	Left: 		
	Habitat: Gibber plain with dead forb tussocks			
Transect H				
	Bearded dragon skeleton			

APPENDIX IV – CLIMATE

The area surveyed falls within the arid zone of north-east South Australia.

1. Rainfall

The closest weather station to the survey area is Bureau of Meteorology station number 17028 at Innamincka Station. The rainfall record for this station goes back to 1882.

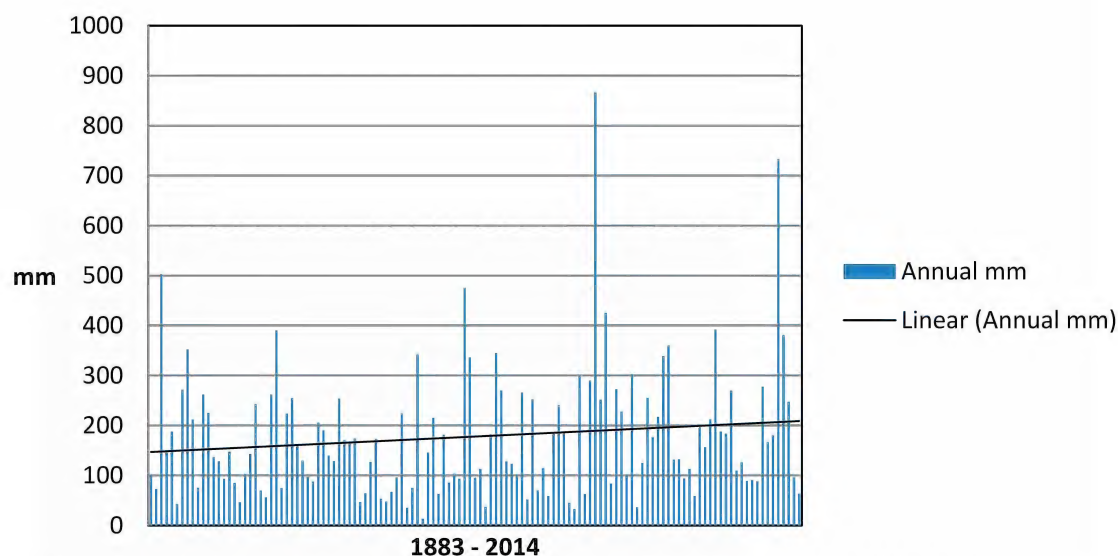


Fig. 1. Innamincka Station rainfall grand total per year and trend 1883-2014

Annual rainfall is extremely variable but shows a slight upward trend over the last 130 years. This trend is still evident after excluding the extreme rainfall years of 1974 and 2010.

2. Temperature

The closest weather station to the survey area that records temperature is Bureau of Meteorology station number 17123 at Moomba. The temperature records go back to 1996.

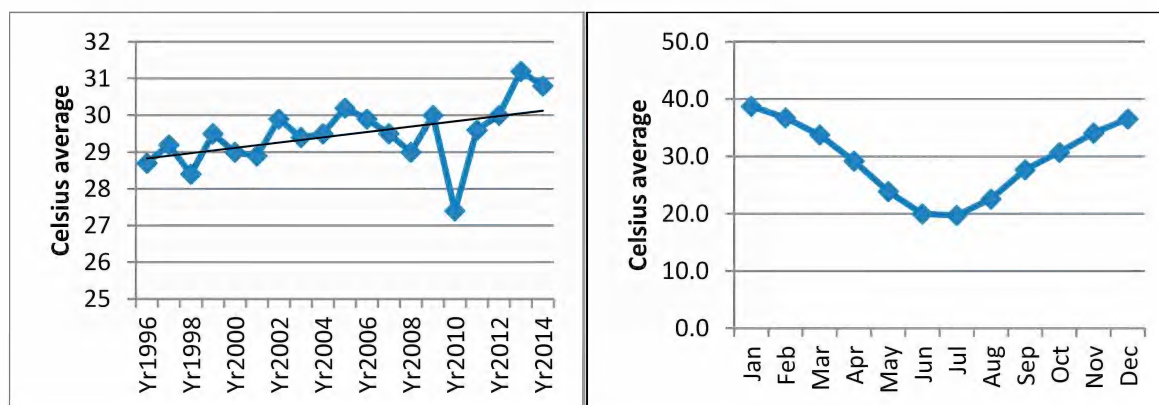


Fig. 2. Moomba Station temperature - 1996-2014

Left: Average annual temperature including trend. Right: Average monthly temperature.

Source: Bureau of Meteorology

APPENDIX V – USING A GPS TO NAVIGATE TRANSECT SQUARES

Each survey team needs to have at least one member with a GPS unit and some basic skills in using it. Given that a variety of GPS units will be brought to the survey task by different volunteers, the following guidelines are generic in nature.

Two alternative methods are given below for navigating the two transect squares for each census stop.

Preliminary Skills

Users should come to the task knowing how to:

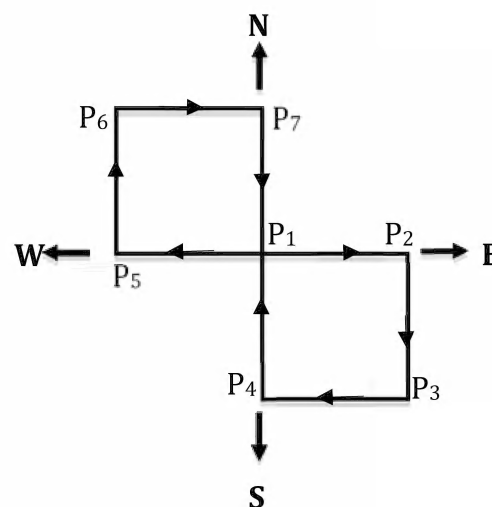
1. set up their GPS units to locate positions using
 - (a) metric units
 - (b) UTM position format[for the Innamincka area the UTM zone/band is 54 J and the position is given by a 6 or 7 digit **easting** (depending on whether or not the leading zero is shown) and and a 7 digit **northing**. E.g. 54 J 0467632 6929509. These numbers may appear on two lines, with the easting on the top line. The “54 J” may or may not be shown]
2. mark and find waypoints
3. show, not necessarily on the same page/screen
 - (a) the easting and northing for the current position
 - (b) the distance from a given waypoint

METHOD 1

Navigating Transect Squares

Starting at census stop SL1 corner point 1 (P₁ in the diagram), the survey consists of two transect squares with the 500 m sides oriented along the principal compass directions as shown.

1. Mark P₁ as a waypoint on the GPS unit (e.g. call it waypoint 101)
Record the easting and northing in a notebook (see Table below).
2. Select “Find” or “GoTo” waypoint 101 – your unit should tell you that you are already there!
3. Walk in an easterly direction by keeping the northing constant (you may need to adjust it by veering southwards to reduce the northing to the desired value, or by veering northwards to increase the northing to the desired value.) It is not necessary to be exactly due east of P₁ at all times so it is quite OK to make detours around obstacles such as thorn bushes!
4. While proceeding eastwards, check your distance from P₁ from time to time. When this distance approaches 500 m adjust your position so that your northing is exactly the same as at P₁ and your distance from P₁ is exactly 500 m. Mark this point as P₂ (e.g. waypoint 102) and record the easting and northing in your notebook.
5. Repeat the above process to locate P₃, 500 m south of P₂. This time you will need to keep the easting constant and the northing will decrease as you go.
6. Repeat the above process for each side of the two transect squares.



Notes

- Eastings get larger as you move eastwards and smaller as you move westwards. Northings get larger as you move northwards and smaller as you move southwards.
- A possible format for your record book is shown. Note that eastings and northings are alternatively equal as you move from one point to the next.

Census stop SL1 Waypoints

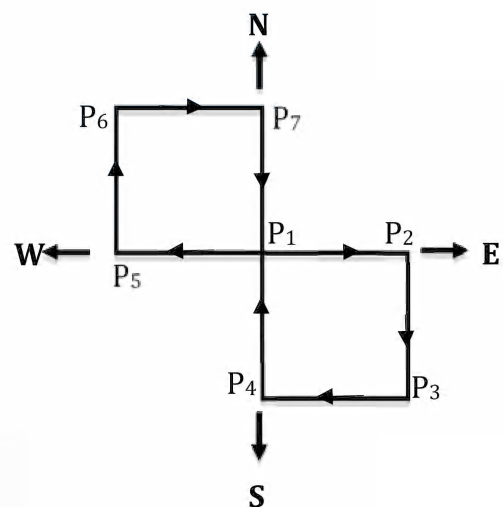
Waypoint	Easting	Northing
101 (P ₁)	a	b
102 (P ₂)	c	b
103 (P ₃)	c	d
104 (P ₄)	a	d
101 (P ₁)	a	b
105 (P ₅)	e	b
106 (P ₆)	e	f
107 (P ₇)	a	f
101 (P ₁)	a	b

METHOD 2

Navigating Transect Squares

Starting at census stop SL1 corner point 1 (P₁ in the diagram), the survey consists of two transect squares with the 500 m sides oriented along the principal compass directions as shown.

1. Mark P₁ as a waypoint on the GPS unit (e.g. call it waypoint 101). In a notebook draw up a table as shown below and record the easting ('e') and northing ('n') of P₁.
2. Calculate the eastings and the northings for the other seven corner points of the survey squares by adding or subtracting 500 as shown by the formulas in the table. Enter all eastings and northings on your table.



Census Stop SL1 Waypoints

Waypoint	Easting	Northing
101 (P ₁)	<i>e</i>	<i>n</i>
102 (P ₂)	<i>e</i> +500	<i>n</i>
103 (P ₃)	<i>e</i> +500	<i>n</i> -500
104 (P ₄)	<i>e</i>	<i>n</i> -500
101 (P ₁)	<i>e</i>	<i>n</i>
105 (P ₅)	<i>e</i> -500	<i>n</i>
106 (P ₆)	<i>e</i> -500	<i>n</i> +500
107 (P ₇)	<i>e</i>	<i>n</i> +500
101 (P ₁)	<i>e</i>	<i>n</i>

3. Walk in an easterly direction by keeping the northing constant (you may need to adjust it by veering southwards to reduce the northing to the desired value, or by veering northwards to increase the northing to the desired value). It is not necessary to be exactly due east of P₁ at all times so it is quite OK to make detours around obstacles such as thorn bushes!
4. While proceeding eastwards, monitor the easting of your current position. When this approaches the desired easting ($e+500$) adjust your position so that your northing is exactly the same as at P₁ (n) and your easting is exactly ($e+500$). You have now reached the point P₂ (waypoint 102).
5. Repeat the above process to locate P₃, 500m south of P₂. This time you will need to keep the easting constant and the northing will decrease as you go.
6. Repeat the above process for each side of the two transect squares.

Note

- Eastings get larger as you move eastwards and smaller as you move westwards.
- Northings get larger as you move northwards and smaller as you move southwards.
- Example calculation:

Census Stop SL1 Waypoints

Waypoint	Easting		Northing	
101 (P ₁)	e	0431028	n	6953816
102 (P ₂)	$e+500$	0431528	n	6953816
103 (P ₃)	$e+500$	0431528	$n-500$	6953316
104 (P ₄)	e	0431028	$n-500$	6953316
101 (P ₁)	e	0431028	n	6953816
105 (P ₅)	$e-500$	0430528	n	6953816
106 (P ₆)	$e-500$	0430528	$n+500$	6954316
107 (P ₇)	e	0431028	$n+500$	6954316
101 (P ₁)	e	0431028	n	6953816

While it would be possible to manually input these coordinates into the GPS unit and to then use the “Find” or “GoTo” function, the process would be time-consuming and tedious and the following of the direction arrow is not likely to give a more precise transect square than the method of maintaining eastings and northings detailed above.

APPENDIX VI - EQUIPMENT LIST

- EPIRB (if you have one) or Satellite phone (if you have one)
- Hand-held UHF radio for staying in contact while surveying (*to be carried on your person at all times when out of the car, along with at least one set of spare batteries*)
- GPS for each group (*to be carried at all times when out of the car, along with at least one set of spare batteries*)
- Compass (*to be carried on your person at all times when out of the car*)
- Plenty of spare batteries
- Survey sheets and a clip board, notebook and pencils
- Watch for telling the time (or use GPS clock)
- Digital camera with large memory card
- Small ruler or measuring card for photographing with tracks etc.
- Car chargers for the various pieces of electronic equipment / rechargeable batteries
- Car chargers for the various pieces of electronic equipment / rechargeable batteries
- Star picket / dropper, plastic dropper cap, star dropper plunger
- Census point marker plate stamped for census point e.g. FOIR SL01, bolt, washer and nut, spanner
- Personal protective equipment (PPE)
- First Aid box